

WHAT IS CLAIMED IS:

1. A method of producing a helical coil chip comprising the steps of:

forming a plurality of wires juxtaposed with  
5 predetermined intervals on an upper surface and a lower surface of a substrate by thin film formation processing means;

cutting said substrate in a direction different from the direction in which said wires extend, into a  
10 plurality of cut substrates; and

forming additional wires on said cut substrates to connect said plurality of wires juxtaposed on the upper and lower surfaces of said substrates respectively at the same time for all of said cut  
15 substrates by thin film formation processing means.

2. A method of producing a helical coil chip according to claim 1, wherein after said substrate is cut into the plurality of cut substrates, said cut  
20 substrates are combined to form a collective substrate in which the cut surfaces of said cut substrates constitute upper and lower surfaces of said collective substrate, and said additional wires are formed on the upper and lower surfaces of said  
25 collective substrate.

3. A method of producing a helical coil chip

according to claim 1, wherein said substrate is made  
of a material having low dielectric loss  
characteristics, and a terminal electrode is formed  
on either one of the surfaces of said cut substrates  
5 on which said wires or said additional wires are  
formed after said additional wires have been formed.

4. A helical coil chip comprising a helical  
coil formed by connecting a plurality of wires formed  
10 to be juxtaposed on an upper surface and a lower  
surface of a substrate with a plurality of additional  
wires formed on a cut surface obtained by cutting  
said substrate in a direction different from the  
direction in which said wires extend.

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5. A helical coil chip according to claim 4,  
wherein said substrate is made of a material having  
low dielectric loss characteristics, and a terminal  
electrode is provided on either one of the surfaces  
20 of said substrate on which said wires or said  
additional wires are formed.

6. A method of producing a helical coil chip  
comprising the steps of:  
25 forming a plurality of wires extending parallel  
to each other with predetermined intervals on an  
upper surface and a lower surface of a substrate,

wherein said wires on the upper and lower surfaces of said substrate are arranged to extend in the same direction;

cutting said substrate in a direction different  
5 from the direction in which said wires extend in such a way that said wires are cut to a predetermined length, into a plurality of cut substrates;

reconstructing said cut substrates as a collective substrate by means of an adhesive and a  
10 plurality of supplemental members, wherein the cut surfaces of said cut substrates are arranged to face upward and downward in said collective substrate; and

forming a plurality of wires, which have a length equal to the thickness of said substrate plus  
15 the thickness of said wires formed on the upper and lower surfaces of said substrate and extend parallel to each other with said predetermined intervals, on the upper and lower surfaces of said collective substrate, wherein each of said plurality of wires  
20 connects end portions of said wires formed on the upper and lower surfaces of said substrate that pass through the thickness of said collective substrate.

7. A method of producing a helical coil chip  
25 according to claim 6, wherein each of said step of forming wires on the upper and lower surfaces of said substrate and said step of forming wires on the upper

and lower surfaces of said collective substrate includes a step of forming a protective film on said wires.

5           8. A method of producing a helical coil chip according to claim 6, wherein said step of forming a plurality of wires on the upper and lower surfaces of said collective substrate includes a step of forming a terminal electrode of said helical coil chip on  
10 either one of the upper and lower surfaces of said collective substrate.

          9. A method of producing a helical coil chip according to claim 6, wherein said step of  
15 reconstructing the cut substrates as a collective substrate by means of an adhesive and a plurality of supplemental members comprises the steps of:

          juxtaposing said plurality of supplemental members with regular intervals therebetween, each of  
20 said intervals being larger than the thickness of said substrate plus the thickness of said wires formed on the upper and lower surfaces of said substrate by a predetermined amount;

          fitting each of said cut substrates to each of  
25 the interval spaces in such a way that the cut surfaces of the cut substrates are oriented in a direction perpendicular to the direction in which

said supplemental members are juxtaposed;

combining said cut substrates and said plurality of supplemental members by means of said adhesive; and

5 grinding such two faces of said cut substrates and said plurality of supplemental members that have been combined that are perpendicular to the direction in which said supplemental members are juxtaposed.

10 10. A method of producing a helical coil chip according to claim 6, wherein said step of reconstructing the cut substrates as the collective substrate by means of an adhesive and a plurality of supplemental members comprises the steps of:

15 orienting the cut surfaces of said cut substrates in a predetermined direction and arranging said cut substrates and said plurality of supplemental members alternately in a direction perpendicular to said predetermined direction;

20 combining said cut substrates and said plurality of supplemental members by means of said adhesive; and

grinding such two faces of said cut substrates and said plurality of supplemental members that have  
25 been combined that are oriented in said predetermined direction so that end portions of said wires formed on the upper and lower surfaces of said substrate are

exposed.

11. A collective substrate to be used in  
producing a helical coil chip as a base material of  
5 the helical coil, comprising:

core members arranged substantially parallel to  
each other with substantially regular intervals  
therebetween with their upper and lower surfaces  
being exposed at upper and lower surfaces of said  
10 collective substrate, said core members extending in  
a predetermined direction and having low dielectric  
loss characteristics;

a plurality of wires in close contact with said  
core members, said plurality of wires passing through  
15 said collective substrate in a direction different  
from the direction in which said core members extends  
so that end portion of the wires are exposed at the  
upper and lower surfaces of said collective  
substrate; and

20 a base portion that fills a space between said  
plurality of wires and said core members.

12. A helical coil chip comprising a core  
member made of a material having low dielectric loss  
25 characteristics, a coil formed by metal plating and  
wound around said core member, and a layer  
functioning as a seed for metal plating provided

between said core member and said coil.

13. A helical coil chip according to claim 12  
wherein said coil contains Cu as a main material and  
5 said seed contains CrCu or TiCu as a main material.